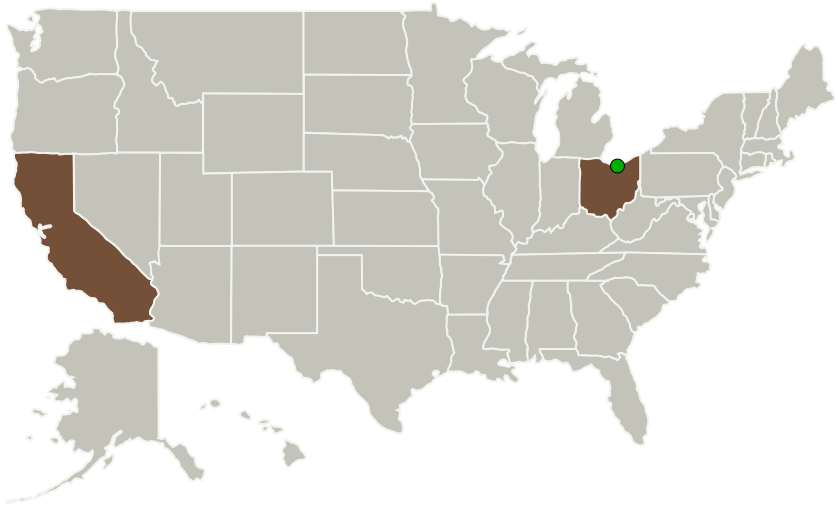
Electronically Steerable Antennas with Panoramic Scan Field of View, Phase I

Completed Technology Project (2011 - 2011)

Project Introduction

Electronically steerable antennas are key to effective radio transmission at millimeter-wave frequencies. To enable communication with rovers, robots, EVA astronauts, and other highly maneuverable elements in planetary surface explorations, steerable antennas must be capable of full 360 degree (panoramic) azimuth scan. For base stations and fixed communication terminals, the antenna must be capable of producing multiple independently-steerable beams. Multi-beam antennas with passive beam-forming networks present ideal candidates for these scenarios, and are preferable to phased-array antennas from the points of view of multi-user capability and DC power consumption. In the framework of this SBIR project, Freeform Wave Technologies, LLC proposes to develop a panoramically steerable multi-beam antenna technology for NASA's K- and Ka-band mobile radios. The proposed technology is based on novel quasi-optical beam-forming concepts and can lead to compact, light-weight, and highly versatile antenna topologies. Analytical and computational tools and methodology for designing the beam-forming network will be developed (phase I), and 16-element array prototypes with single and multiple steerable beams will be designed and manufactured (in Phase II) for 18-40 GHz and 25.5-27 GHz frequency bands, respectively.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Freeform Wave Technologies, LLC	Lead Organization	Industry	Los Angeles, California
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
California	Ohio

Project Transitions

February 2011: Project Start

September 2011: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138124)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Freeform Wave Technologies, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

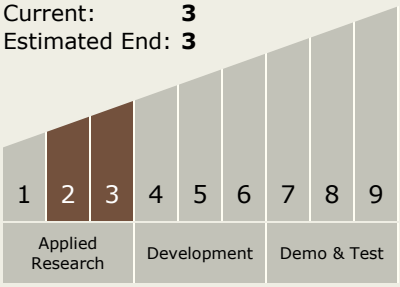
Carlos Torrez

Principal Investigator:

Abbas Abbaspour-tamijani

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
  - TX05.2 Radio Frequency
    - TX05.2.6 Innovative Antennas

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System